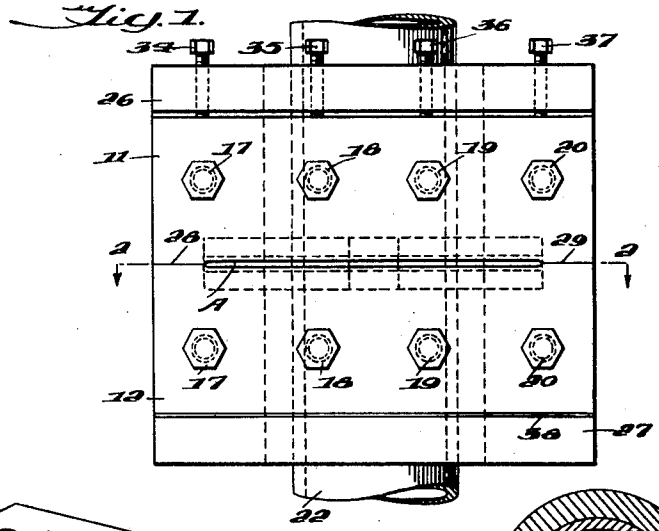
March 10, 1964 L. R. FOREMAN 3,123,952

METHOD OF RECONDITIONING NOZZLES PRIMARILY USEFUL FOR DEBARKING LOGS WITH HIGH PRESSURE WATER JETS

Original Filed Nov. 18, 1958

Fig. 1.



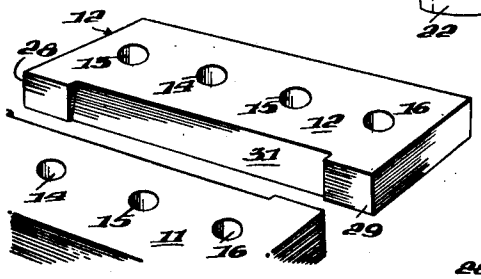


Fig. 3.

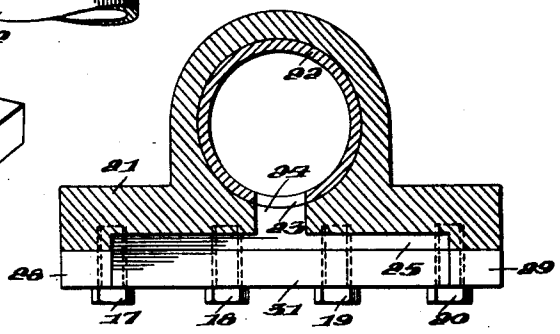


Fig. 2.

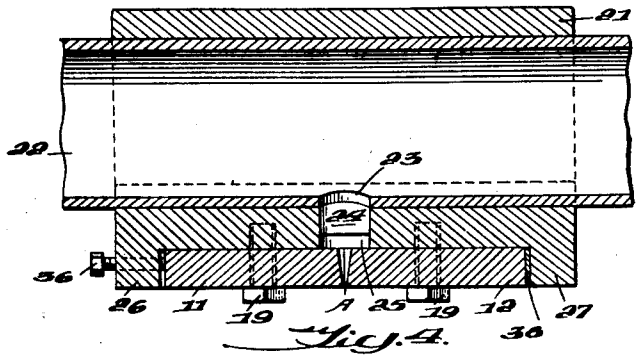


Fig. 4.

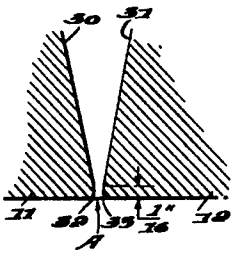


Fig. 5.

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METHOD OF RECONDITIONING NOZZLES PRIMARILY USEFUL FOR DEBARKING LOGS WITH HIGH PRESSURE WATER JETS

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Original application Nov. 18, 1958, Ser. No. 774,668, now Patent No. 2,969,190, dated Jan. 24, 1961. Divided and this application Aug. 19, 1959, Ser. No. 834,869
2 Claims. (Cl. 51—281)

This invention relates to a novel method of reconditioning nozzles which are used to debark logs by means of high pressure (1400–1500 p.s.i.) water jets.

The present application is a division of co-pending application Serial No. 774,668, filed November 18, 1958, issued as Patent No. 2,969,190, dated January 24, 1961, which was a continuation-in-part of application Serial No. 644,128, filed March 5, 1957, but now abandoned; this latter application having been filed as a continuation-in-part of the application resulting in Patent No. 2,800,155, dated July 23, 1957.

In said patent, I have shown a stationary (i.e., non-traveling) high pressure water jet directed downwardly against a log which is supported horizontally on a traveling carriage, which is moved back and forth on tracks under the jet, the carriage having sets of log-supporting wheels which are rotated to turn the log on its longitudinal axis as the carriage reciprocates. The high pressure water issues from the nozzle as a flat fan-shaped jet and as the jet strikes the bark of the rotating log it rips the bark off by a spiral chiseling action and fragmentizes the bark and tosses it into the air, clear of the carriage. The log during the debarking is also cleansed of substantially all dirt, grit, stones etc. The log is then thrown laterally off the carriage and is conveyed immediately to the sawing station.

The very high water pressure necessary for the described operation, plus the impurities usually present in the available water, cause rapid erosion of the metal surfaces of the nozzle aperture. Sometimes the nozzle gives good service for only a few days, sometimes for several weeks; but always when the jet of water becomes inefficient due to such erosion, the machine must be stopped, the two nozzle blocks must be removed, and new or reconditioned nozzle blocks must be installed, which means a loss of 20 to 25 minutes' production time. The eroded nozzle blocks are taken to a machine shop and reconditioned by the method described below, after which the blocks are ready for re-use.

In the accompanying drawings forming a part of this specification—

FIG. 1 is a bottom plan view of my nozzle, the jet aperture of which is shown exaggerated in width to make it visible on the scale of the drawing, showing also a portion of the header for supplying water under high pressure to the nozzle;

FIG. 2 is a vertical cross section on line 2—2 of FIG. 1;

FIG. 3 is a perspective view of one of the nozzle blocks shown separated from the complementary block, only part of which is illustrated;

FIG. 4 is a vertical section on line 4—4 of FIG. 2;

FIG. 5 is a detail in vertical cross section, on an enlarged scale, showing the shape of the walls of the jet aperture, whose width is exaggerated for clearness.

As disclosed in said pending application, my nozzle includes two massive alloy steel blocks each preferably about 16 in. long, 4 in. wide and 2 in. thick, so shaped that when laid together their abutted edges provide a jet aperture $\frac{1}{25}$ in. wide and 11 in. long, or longer if desired. To provide the necessary volume of water at a pressure of 1400–1500 p.s.i., I use two motor-driven booster pumps in tandem, requiring 800 H.P., the general arrangement

being shown in FIGS. 1 and 2 of my Patent No. 2,800,155. A jet of this size, shape and power will tear or split softwood logs if they are not properly moved during the debarking operation.

Referring to FIGS. 1–4, two nozzle blocks 11 and 12 are shown as parts of the nozzle. Since these nozzle blocks are substantially identical, being mirror images of each other, a detailed description of one block will suffice for both. Block 11 has four bolt holes 13, 14, 16 and 16 extending through it from top to bottom, each bolt hole being preferably 1⅜ in. in diameter, and all four holes being in a plane that is approximately or exactly medial of the nozzle block. Through these bolt holes four 1¼ in. studs 17, 18, 19 and 20 respectively are passed to secure each block rigidly but adjustably upon a massive nozzle body 21, which in turn is rigidly mounted as by welding upon a header 22 coupled to the high pressure water supply mentioned above. Header 22 has a discharge port 23 on its underside, and nozzle body 21 has an inlet port 24 registering with port 23. A delivery chamber 25 is formed within nozzle body 21 to receive the water discharged from port 24, said chamber having the same length as the aperture A from which the jet issues. Nozzle body 21 further has a pair of integral downwardly extending flanges 26, 27 between which the nozzle blocks lie in the same plane when they are bolted to the nozzle body.

When so positioned, the nozzle blocks are in direct contact with each other only at their abutted surfaces 28, 29, which are rectangular plane finished surfaces located at the opposite ends of each block, and standing vertically when the blocks are in place. As shown in FIGS. 1 and 3, the aperture A extends between abutted surfaces 28, 29 and is straight throughout its length. Sloping or beveled surfaces 30, 31 are provided on the facing edges of blocks 11, 12 respectively, and the two opposed surfaces 30, 31 together provide a narrowing passageway for the water flowing from the delivery chamber 25 to aperture A. This aperture is formed principally by two opposed vertically curvilinear surfaces 32, 33 on blocks 11, 12 respectively (FIG. 5) and as illustrated, the narrowest part of the aperture is spaced about $\frac{1}{16}$ in. in from the lower faces of the nozzle blocks. This narrowest part is $\frac{1}{25}$ in. wide throughout its length at the start of a debarking operation.

When erosion from the high pressure water has worn away the walls 32, 33 to the extent that aperture A has a width of $\frac{1}{18}$ in., the efficiency of the jet is so diminished that the nozzle must be reconditioned. To effect this, studs 17—20 are removed, the nozzle blocks are separated from the nozzle body and are carried to a machine shop. There the surfaces 29, 30 of both blocks are refinished, also the aperture surfaces 32, 33 are reground if necessary to restore the original $\frac{1}{25}$ in. width of the aperture A at its narrowest point. Then the blocks are set aside for re-use when needed.

As disclosed in said Patent No. 2,969,190, a plurality of adjustment screws 34—37 are tapped through flange 26 and bear at their inner ends against block 11, thrusting it against block 12 with sufficient force to substantially seal the contacting plane surfaces 28, 29, no packing being used. Even after many reconditioning operations as described above, the adjustment screws 34—37 will hold the reground nozzle blocks together in sealed relation, without packing. Shims 38 (FIG. 4) may be used with the adjustment screws, being inserted between flange 27 and block 12, to position the aperture A centrally relative to the delivery chamber 25. The bolt holes 13—16, being larger than the studs 17—20, permit some relative movement of the blocks for adjustment of their positions; or the bolt holes may be elongated for a wider latitude of adjustment. Obviously as the nozzle blocks are ground

on abutting surfaces 29, 30, there may be a need for several shims 38 to insure proper positioning of the aperture A.

Having described how my nozzle may be repeatedly reconditioned to restore its efficiency so that it will give long service even under very severe conditions, what I claim as new and desire to secure by Letters Patent is:

1. A method of restoring the efficiency of an eroded nozzle used for projecting jets of high pressure water, said nozzle being characterized by the employment of two abutted metallic nozzle blocks lying in the same plane and together providing an elonagted straight narrow jet-discharging aperture extending between the abutted surfaces of the blocks; said method consisting of first separating the blocks from the nozzle body and then grinding all the directly contacting surfaces of both the blocks and grinding the surfaces forming said elongated aperture,

the grinding being continued until at the conclusion of operations, the aperture is a straight opening which at its narrowest point is about $\frac{1}{25}$ in. wide throughout its length.

2. The invention defined in claim 1, wherein the grinding is continued until the narrowest part of the aperture is about $\frac{1}{16}$ in. in from the outer surfaces of the two nozzle blocks, with separating curvilinear surfaces extending from said narrowest point to said outer surfaces.

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